Supplementary Information:

Core-mantle fractionation of carbon in Earth and Mars: The effects of sulfur

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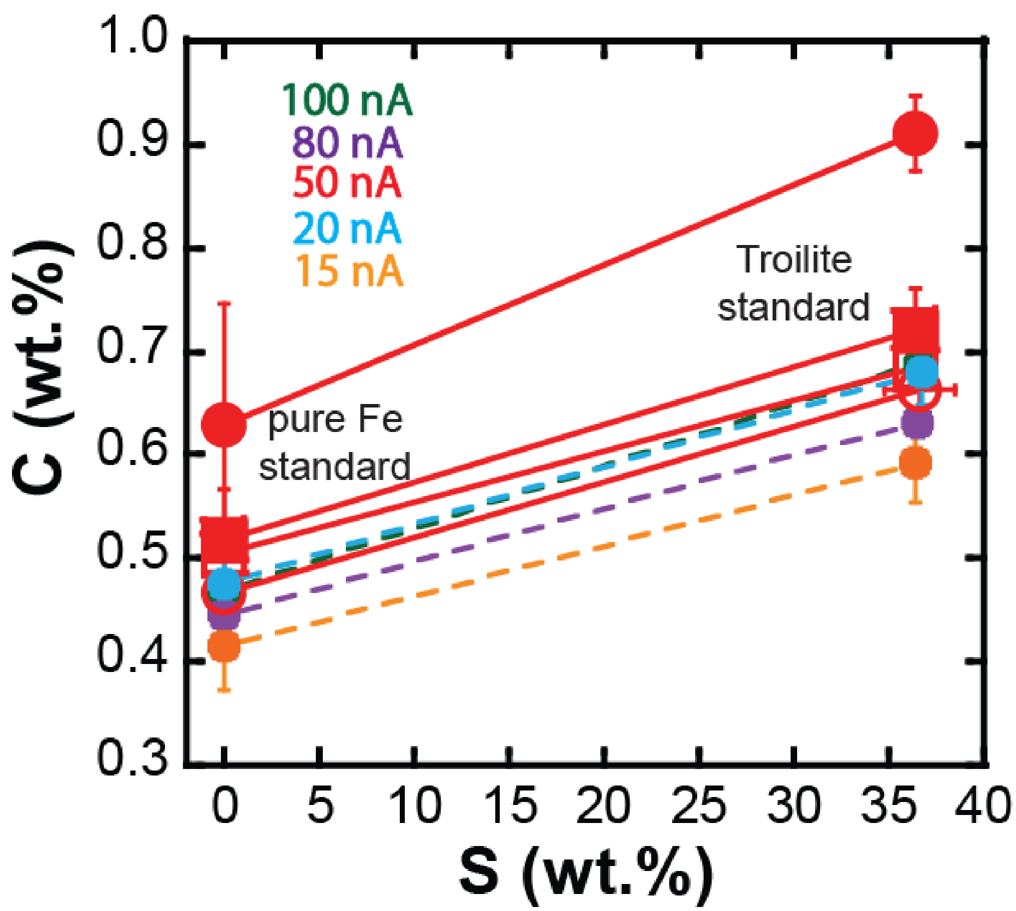
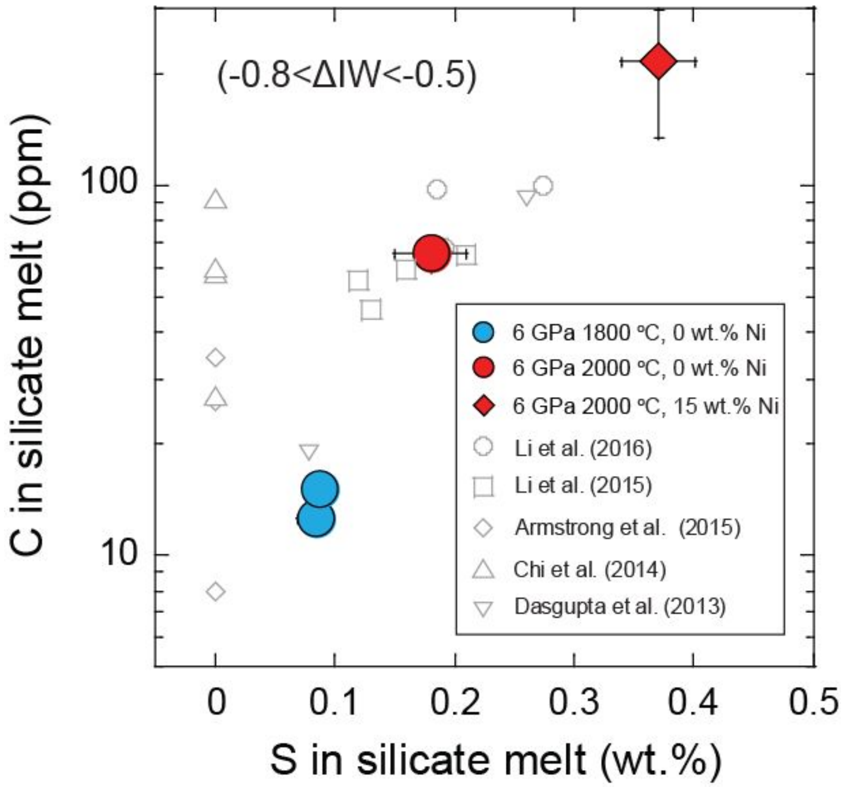
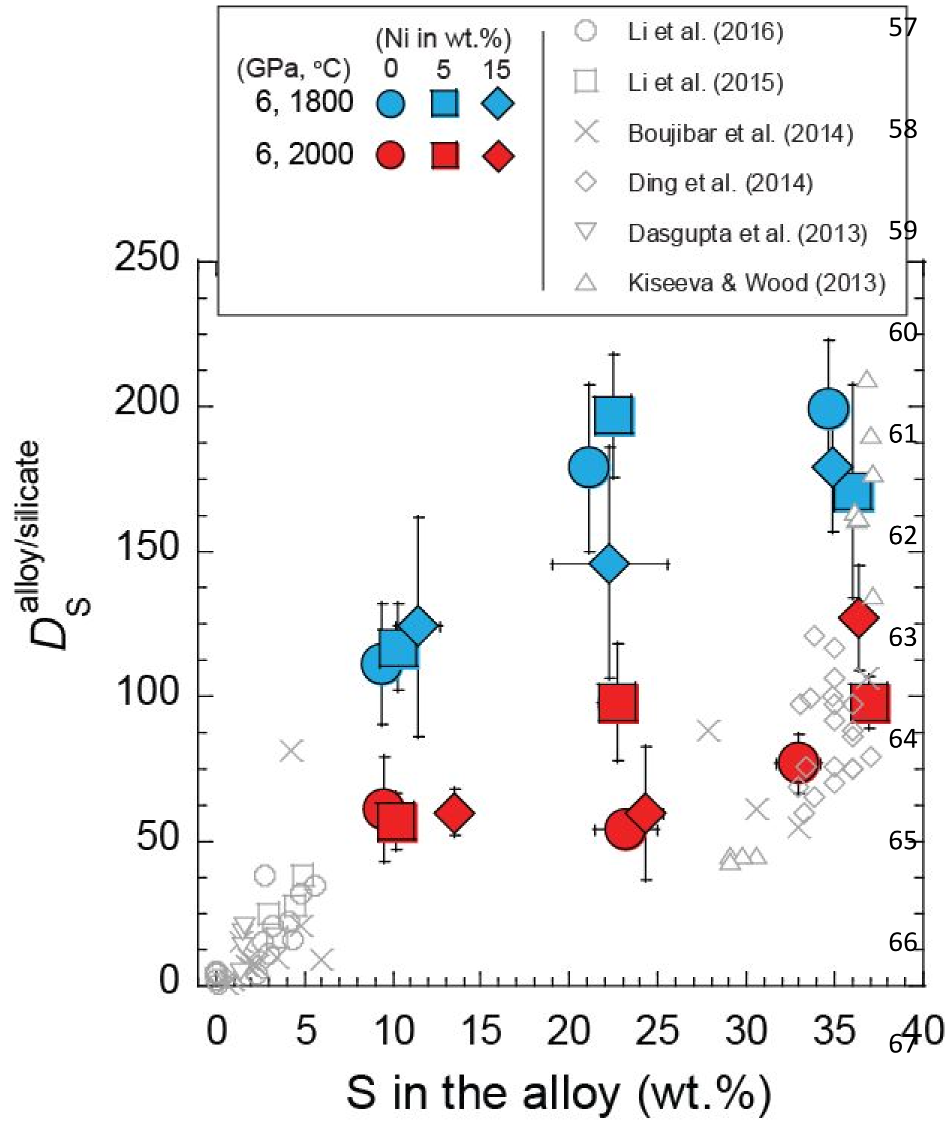


Supplementary Fig. 1. Analyses of carbon on a pure Fe and troilite standards using a JEOL JXA-8530F Hyperprobe and LDE2 crystal, 12 kV accelerating voltage, and a beam current of 10-100 nA . The data on hydrocarbon contamination in pure Fe and troilite in each session are shown using identical symbols with a tie line. These tie lines were used to employ background correction for C analyses in alloy melts with variable sulfur contents.



Supplementary Fig. 2. C solubility in silicate melt (in ppm) as a function of S content (in wt.%) in the silicate melt. We only plotted the experiments at ΔIW between -0.5 and -0.8 to show the effect of dissolved S on C solubility in silicate melt (at graphite saturation) in a limited oxygen fugacity range.



Supplementary Fig. 3.

$D_{\mathrm{S}}^{\mathrm{alloy/silicate}}$ (partition coefficient of S between alloy liquid and silicate melt) as a function of S in the alloy liquid for the relevant fO_2 range ($-2<\Delta IW<-0.4$). Also plotted for comparison are experimental data from previous studies (Boujibar et al., 2014; Dasgupta et al., 2013; Ding et al., 2014; Kiseeva et al., 2013; Laurenz et al., 2016; Li et al., 2016, 2015)

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